

## Abstract

The discrete Fourier transform (DFT) is computed in a plurality of parallel processors. A DFT of length  $N$  is divided into  $r$  partial DFTs of length  $(N/r)$ , in which the  $r$  partial DFTs are calculated in separate parallel processors and then combined in a combination phase to form a complete DFT of length  $(N)$ . The  $r$  partial FFTs are able to be computed in parallel multiprocessors by defining the mathematical model of the combination phase in such manner so as to allow the  $r$  parallel processors to operate independently and simultaneously. A second embodiment presents a radix- $r$  fast Fourier algorithm that reduces the computational effort as measured by the number of multiplications and permits the  $N/r$  parallel processors to operate simultaneously and with a single instruction sequence.